REMARKS

INTRODUCTION

Claims 1-27 were previously and are currently pending and under consideration.

Claims 1-27 stand rejected.

Claims 1, 3-20, and 24 are amended herein.

No new matter has been added. Reconsideration and withdrawal of the rejections is respectfully requested.

REJECTION UNDER 35 USC § 103

Claims 1-27 stand rejected under 35 USC § 103 as obvious over Lothberg in view of Cheriton ("Lothberg-Cheriton"). For reasons presented below, reconsideration and withdrawal of the rejection is respectfully requested.

Prior Art: Cheriton

Cheriton discusses a technique for facilitating the transmission of remote direct memory access (RDMA) transfers (e.g. SCSI transfers) via transport protocol segments (e.g. TCP segments). RDMA transfers are transfers that are addressed to remote memory thus allowing the transferred payloads to be placed in an application or host-side buffer without having to keep them in a NIC-based reassembly buffer. To facilitate these kinds of transfers, Cheriton places RDMA information such as remote memory location information in TCP headers, specifically, in the options field of the TCP headers.

A notable requirement of Cheriton is that the RDMA information must be placed in the TCP header. Consider the following portions of Cheriton:

"Use of a TCP option technique enables ... copy[ing] data directly from the incoming packet" (Abstract);

"To use the RDMA option, the sender places option bytes in the header of each TCP segment containing RDMA data. The RDMA option bytes describe the location of the RDMA data in the TCP payload to the receiver, which allows the receiving system to load the RDMA data directly to application memory" (column 3, lines 54-58, emphasis added);

"It is important to note that the RDMA option is simply an annotation or byte code within the TCP header" (column 3, lines 54-57, emphasis added);

"TCP header 100 includes within it a field for options 100 and padding 120 immediately preceding the data payload field 130" (column 3, lines 63-65, emphasis added);

"The RDMA option must appear on every segment containing data that is part of an RDMA transfer" (column 5, lines 11-14); and

each independent claim mentions that the RDMA byte codes are in the packet header.

Based on the portions noted above, Cheriton clearly includes RDMA information (e.g. offset, length, etc.) only inside the TCP header. Cheriton describes variations in how a remote memory location may be described within the TCP header (see Figures 3 and 6). However, each of these variations requires some form of RDMA information to be placed in the options field of the standard TCP header itself. Cheriton explicitly disclaims using upper layer headers themselves (column 3, lines 35-37).

Prior Art: Lothberg

Lothberg discusses a protocol for tunneling network communications through IP packets. Lothberg provides a predefined set of mappings to map a non-IP packet, cell, frame, etc. to a universal transport encapsulation (UTE) packet which is in turn carried

by an IP packet. The general idea in Lothberg is to make it easier to tunnel non-IP traffic through an IP network ("method of providing virtual path communications for users", column 2, lines 8-12).

A relevant aspect of Lothberg is that it operates at the network level. Consider that (1) mapping is performed at the interface to the tunnel, (2) after being conveyed through the tunnel the receiving device reconstitutes the original packet (e.g. ATM cell) by stripping the universal header and reverse mapping the universal protocol, and (3) "The reconstituted payload packet is then available for further routing within the receiving user network" (column 2, lines 33-47, emphasis added). Also, "the UTI encapsulation is stripped off the payload and the contents of the transport packet are mapped back into payload packet format ... The payload packet is then presented to destination user network 120 in its original form, i.e. the format that first entered the ingress interface 210" (column 4, lines 28-34).

In sum, Lothberg operates at the network level rather than the transport level

Prior Art: Lothberg-Cheriton

The rejection proposes combining Lothberg with Cheriton. For reasons discussed further below, Applicant respectfully traverses the combination. However, if for the purpose of discussion only it is assumed that the references can be combined, then the Lothberg-Cheriton combination is nothing more than a system that can provide IP tunneling for network packets that are carrying transport-level packets (e.g. TCP packets/segments) that have RDMA information in their respective TCP headers.

Lothberg-Cheriton Does Put Remote Direct Memory Information In Transport Segment Body After Transport Segment Header

Claim 1, for example, recites that each transport segment comprises a standard transport header and a body separate from and following the standard transport header. Furthermore, a framing header is put in the body of each segment that carries corresponding upper layer data. Into that framing header is put information indicating a remote direct memory location for the corresponding upper layer data.

The rejection acknowledges that Lothberg does not teach self-describing segments (item 4 of the Office Action). The rejection states that "Cheriton teaches the use of self-describing description information placed in framing headers". Applicant respectfully disagrees that the byte codes in Cheriton can be considered to be a framing header. As shown in the "Prior Art: Cheriton" section above, the self-describing information in Cheriton is not a header itself but rather is only a series of byte codes that is placed in a TCP header field, specifically, the options field. Whether or not Cheriton's byte codes are properly considered to be a "framing header", they clearly are placed in the transport or TCP header. In claim 1, the segment description information (indicating a remote direct memory location) is put after the transport segment's header and in the body of the segment (note, the framing header is in the body, and the body is recited to be "separate from and following the standard transport header"). In other words, in claim 1 self-describing information (or information indicating a remote direct memory location) is after the standard TCP header, whereas in Cheriton self-describing information is explicitly required by be placed in the TCP header itself. Lothberg was not cited for and does not teach or suggest this feature.

Cheriton's placement of the memory location information in the TCP header may be a significant difference. Some implementations of TCP, particularly older

implementations, may not even implement TCP options. Some implementations may only look at the first TCP option (Cheriton, column 5, lines 20-22). Some implementations may have TCP options disabled by default (e.g. older versions of Windows 98). Furthermore, the options field may carry many different options for different purposes (e.g. RFC 1072, 2018, etc.), possibly resulting in conflicts, cross-purpose errors, complicated parsing, or possibly option overwriting.

Claim 6 recites that "the body of each segment that transports data for the upper layer protocol is provided with one or more corresponding integral ULP PDUs that each has a header comprising segment description information" (i.e. the segment body rather than the segment header contains the description information). Claim 11 recites a similar feature.

Claim 16 recites that "the framing header and all of the upper layer data framed thereby are put in the body of the same transport segment", where the body explicitly comes after the transport segment's header.

Claims 20 and 24 recite that "the header [containing the segment description information] is put in the body of the transport segment".

Withdrawal of the rejection of claims 1, 6, 11, 16, 20, and 24 is respectfully requested.

Lothberg Operates At Network Level Rather Than Transport Level

Claim 1 recites that its segments are segments of a transport-level protocol that is layered above a network-level protocol. Claims 6, 11, 16, 20, and 24 include similar recitations. In contrast, as discussed above in the "Prior Art: Lothberg" section, Lothberg only functions at the network level which is below the transport level. In other words, when Lothberg inserts a UTE header, it inserts it into the payload body of an IP

packet which is not a transport segment or a segment of a transport-level protocol. When tunneled traffic is stripped out at an egress point that traffic is presented to a network for further transmission or routing.

Withdrawal of the rejection of claims 1, 6, 11, 16, 20, and 24 is respectfully requested.

Lothberg-Cheriton Does Not Ensure Integral ULP PDUs, Or All Data Corresponding to Header Is in Same/One Segment, Etc.

In the prior art mentioned in the present specification, direct memory transfers would be fed to a transport/TCP module, blindly split up among transport segments, and transmitted. As discussed in the present specification, this would result in some segments carrying direct memory data that lacked enough information to be placed in memory. For example, a direct memory frame could be split between two segments but only one segment would have the frame header; the other segment would have the rest of that header's application data and would not know how to directly map it to memory. Various claims previously mentioned alignment. Applicant has amended the claims with the intent not of narrowing the claims but rather clarifying the meaning of segment alignment as previously understood by Applicant in view of the specification.

Claim 1 recites that "the segment description information indicat[es] a remote direct memory location for the corresponding data of the upper layer protocol transfer that is being carried by the segment". See also claim 11. Claim 6 recites "ensuring that the body of each segment that transports data for the upper layer protocol is provided with one or more corresponding integral ULP PDUs that each has a header comprising segment description information indicating a remote direct memory location for corresponding data of the upper layer protocol". Claim 16 recites "ensuring that the

framing header and all of the upper layer data framed thereby are put in the body of the same transport segment". Claims 20 and 24 recite that "all data corresponding to the header is ensured to be encapsulated in the body of the transport segment".

The Lothberg-Cheriton combination does not teach any of these features because, as discussed above, Lothberg-Cheriton includes memory location information in a transport or TCP header. Lothberg and Cheriton, individually or combined, do not teach or suggest ensuring that upper layer data (direct memory data, etc.) is kept with its corresponding header in the body of a transport segment.

Improper Combination

The rejection proposes combining Cheriton with Lothberg. However, as discussed above, these references operate at different levels of the network communication model. Lothberg, as shown above, operates at the networking level; it receives network packets (cells, frames, etc.), encapsulates them in IP (network level) packets, transmits them via IP, receives them, strips out the encapsulated network packets (e.g. cells, frames, etc.), and then presents them to the destination *network* for further network routing before being received by a node or endpoint. In contrast, Cheriton operates above the network level at the transport level. Lothberg is for IP tunneling and the tunneled traffic is presented for further transmission rather than transfer to an application buffer. Combining Lothberg and Cheriton would require a substantial redesign of one or the other. Consider, for example, that Lothberg "does not support packet options, so the options field in the IP header is not used" (column 6, lines 15-17). This appears to be incompatible with Cheriton which relies on options in a transport segment.

Withdrawal of the rejection is respectfully requested.

DEPENDENT CLAIMS

The dependent claims are deemed to be patentable based on their dependence from allowable independent claims. The dependent claims are also independently patentable. For example, claim 2 recites "limiting an upper layer protocol data unit size to the smaller of a maximum transport segment size and a size that will fit within the non self-describing segment ". Lothberg-Cheriton does not discuss or suggest this feature. Withdrawal of the rejection of the dependent claims is respectfully requested.

CONCLUSION

Accordingly, in view of the above remarks it is submitted that the claims are patentably distinct over the prior art and that all the rejections to the claims have been overcome. Reconsideration and reexamination of the above Application is requested. Based on the foregoing, Applicant respectfully requests that the pending claims be allowed, and that a timely Notice of Allowance be issued in this case. If the Examiner believes, after this Amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's representative at the telephone number listed below.

If this Amendment is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this Amendment, including an extension fee that is not covered by an enclosed check please charge any deficiency to Deposit Account No. 50-0463.

Respectfully submitted,

Microsoft Corporation

Date: 24 MAY 2005 By: James Strom

James T. Strom, 48,702
Attorney for Applicants
Direct telephone (425) 706-0362
Microsoft Corporation
One Microsoft Way
Redmond WA 98052-6399

CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR 1.8(a)]

I hereby certify that this correspondence is being:

☐ deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop _____, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450

☒ transmitted by facsimile on the date shown below to the United States Patent and Trademark Office at (703) 872-9306.

24 MAY 2005
Date

James D Strom
Signature

James T. Strom
Type or Print Name

Type of Response: Amendment
Application Number: 10/016,609
Attorney Docket Number: 164147.01
Filing Date: 10/30/2001